

WHAT IS CLAIMED IS:

- 1 1. A cache storage system for use in a data storage system having
2 a plurality of virtual addresses, each virtual address having a data object associated
3 therewith, the cache storage system comprising:
4 a plurality of storage devices, each data object being stored at a
5 storage device location, each storage device location having a unique identifier; and
6 a cache for storing a data object associated with at least one virtual
7 address wherein, for a first virtual address, the first virtual address data object is
8 staged into the cache and, for a second virtual address, a pointer is generated for use
9 in pointing to the first virtual address data object staged in the cache when the
10 storage device location identifier of the second virtual address data object matches
11 the storage device location identifier of the first virtual address data object.
- 1 2. The system of claim 1 wherein the cache comprises a location
2 identifier table for storing at least one storage device location identifier.
- 1 3. The system of claim 2 wherein the cache further comprises a
2 virtual address table for storing a plurality of virtual addresses.
- 1 4. The system of claim 1 wherein the data storage system
2 comprises a disk subsystem, the plurality of storage devices comprise a plurality of
3 disk storage devices, each virtual address comprises a virtual track address, and
4 each storage device location identifier comprises a track number.
- 1 5. The system of claim 1 wherein the pointer comprises an entry
2 in a cache directory, the cache directory entry comprising a location in the cache of
3 a segment storing data associated with a data object shared by the first and second
4 virtual addresses.
- 1 6. A cache storage method for use in a data storage system
2 having a plurality of virtual addresses, each virtual address having a data object
3 associated therewith, the method comprising:

4 providing a plurality of storage devices, each data object being stored
5 at a storage device location, each storage device location having a unique identifier;
6 and

7 providing a cache for storing a data object associated with at least one
8 virtual address wherein, for a first virtual address, the first virtual address data
9 object is staged into the cache and, for a second virtual address, a pointer is
10 generated for use in pointing to the first virtual address data object staged in the
11 cache when the storage device location identifier of the second virtual address data
12 object matches the storage device location identifier of the first virtual address data
13 object.

1 7. The method of claim 6 wherein the cache comprises a location
2 identifier table for storing at least one storage device location identifier.

1 8. The method of claim 7 wherein the cache further comprises
2 a virtual address table for storing a plurality of virtual addresses.

1 9. The method of claim 6 wherein the data storage system
2 comprises a disk subsystem, the plurality of storage devices comprise a plurality of
3 disk storage devices, each virtual address comprises a virtual track address, and
4 each storage device location identifier comprises a track number.

1 10. The method of claim 6 wherein the pointer comprises an entry
2 in a cache directory, the cache directory entry comprising a location in the cache of
3 a segment storing data associated with a data object shared by the first and second
4 virtual addresses.

1 11. A cache storage system for use in a data storage system, the
2 data storage system comprising a plurality of storage devices and having a plurality
3 of virtual addresses, each virtual address associated with a data object, each data
4 object stored at a storage device location, each storage device location having a
5 unique identifier, the cache storage system comprising:

6 a cache for storing a data object associated with at least one virtual
7 address;
8 a virtual address table for storing a plurality of virtual addresses; and
9 a location identifier table for storing at least one storage device
10 location identifier;
11 wherein, for a first virtual address, the first virtual address data
12 object is staged into the cache, the location identifier for the first virtual address data
13 object is stored in the location identifier table, and the first virtual address is stored
14 in the virtual address table and linked to the location identifier for the first virtual
15 address data object stored in the location identifier table, and wherein, for a second
16 virtual address, a pointer is generated for use in pointing to the first virtual address
17 data object staged in the cache when the location identifier of the second virtual
18 address data object matches the location identifier stored in the location identifier
19 table of the first virtual address data object, and the second virtual address is stored
20 in the virtual address table and linked to the first virtual address.

1 12. The system of claim 11 wherein the virtual address table is
2 stored in the cache.

1 13. The system of claim 11 wherein the location identifier table
2 is stored in the cache.

1 14. The system of claim 11 wherein the virtual address and
2 location identifier tables are stored in the cache.

1 15. The system of claim 11 wherein the data storage system
2 comprises a disk subsystem, the plurality of storage devices comprises a plurality
3 of disk storage devices, each virtual address comprises a virtual track address, each
4 storage device location identifier comprises a track number, the virtual address table
5 comprises a virtual track number table, and the location identifier table comprises
6 a track number table.

1 16. The system of claim 11 wherein the pointer comprises an
2 entry in a cache directory, the cache directory entry comprising a location in the
3 cache of a segment storing data associated with a data object shared by the first and
4 second virtual addresses.

1 17. A cache storage method for use in a data storage system, the
2 data storage system comprising a plurality of storage devices and having a plurality
3 of virtual addresses, each virtual address associated with a data object, each data
4 object stored at a storage device location, each storage device location having a
5 unique identifier, the method comprising:

6 providing a cache for storing a data object associated with at least one
7 virtual address;

8 providing a virtual address table for storing a plurality of virtual
9 addresses; and

10 providing a location identifier table for storing at least one storage
11 device location identifier;

12 wherein, for a first virtual address, the first virtual address data
13 object is staged into the cache, the location identifier for the first virtual address data
14 object is stored in the location identifier table, and the first virtual address is stored
15 in the virtual address table and linked to the location identifier for the first virtual
16 address data object stored in the location identifier table, and wherein, for a second
17 virtual address, a pointer is generated for use in pointing to the first virtual address
18 data object staged in the cache when the location identifier of the second virtual
19 address data object matches the location identifier stored in the location identifier
20 table of the first virtual address data object, and the second virtual address is stored
21 in the virtual address table and linked to the first virtual address.

1 18. The method of claim 17 wherein the virtual address table is
2 stored in the cache.

1 19. The method of claim 17 wherein the location identifier table
2 is stored in the cache.

1 20. The method of claim 17 wherein the virtual address and
2 location identifier tables are stored in the cache.

1 21. The method of claim 17 wherein the data storage system
2 comprises a disk subsystem, the plurality of storage devices comprise a plurality of
3 disk storage devices, each virtual address comprises a virtual track address, each
4 storage device location identifier comprises a track number, the virtual address table
5 comprises a virtual track number table, and the location identifier table comprises
6 a track number table.

1 22. The method of claim 17 wherein the pointer comprises an
2 entry in a cache directory, the cache directory entry comprising a location in the
3 cache of a segment storing data associated with a data object shared by the first and
4 second virtual addresses.